

A PLEOMORPHIC SLIME BACTERIUM.

(Bacillus alatus, n.sp.)

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(Plate xxxv.)

In isolating *Rhizobium leguminosarum* from the nodules of *Lupinus luteus*, a peculiar bacterium was found forming slimy colonies upon maltose-ammonium-sulphate-agar. Upon this medium, the bacterium grew, as a rod of greater breadth than length, and attached to the broad ends were rounded wing-like structures. The medium was particularly suited for the production of these forms. The method of division is also peculiar, for as the length is less than the breadth, the cell appears to divide longitudinally. When the microbe has divided, there is but one wing attached, although another soon grows upon the naked end.

The micro-organism is very pleomorphic. In bouillon, upon nutrient meat-agar and upon potato, it occurs as ordinary short or long rods with rounded ends, and stains uniformly. Upon saccharose-potato-agar, they are of the same shape, but stain bipolarly, and they may or may not be surrounded by a rod-shaped capsule. In saccharose-asparagin-fluid, the approximately oval cells occur in chains. Upon ordinary glucose-gelatin, the wings are pronounced, but both the staining portion and the lateral appendages are long, and in some cases the newly divided cells are spatulate or club-shaped.

The effect of various carbonaceous nutrients in conjunction with ammonium sulphate and citrate was tested. Glycerin produces a rod-shaped capsule with a short transverse staining portion or bar, or with a coccoid, or an almost square staining centre.

Raffinose or lactose also gives a rod-shaped capsule with a transverse bar. Levulose produces an ordinary uniformly staining naked rod, while with galactose the rod is similar, but stains bipolarly. Mannit gives a variety of forms such as might be obtained from a mixture of raffinose and galactose. Dextrose behaves like saccharose-potato-agar.

The bacterium is to a certain extent acid-fast, for, when stained with fuchsin, the colour is not discharged by 5% hydrochloric acid, although it is by stronger solutions. It stains well with carbol-violet or carbol-blue; carbol-fuchsin does not differentiate the capsule well. A solution of fuchsin or gentian-violet in 1% acetic acid proved to be best. The Gram stain is negative.

While slime is produced readily and luxuriantly upon certain media with a vegetable base, and therefore with a mixture of nutrients, as with saccharose-potato-glycerin-agar, it is not formed easily upon media of simpler composition. Upon an agar medium containing ammonium sulphate (0.04%) and potassium citrate (0.2%), certain carbonaceous nutrients (2%) gave the following yields of slime from 100 c.c. of medium—maltose 15; glycerin 5; mannit 4; dextrose, galactose, raffinose 2; lactose 1; saccharose, levulose, none.

A quantity of slime was grown upon saccharose-glycerin-potato-agar, and as in all former and similar cases, the gum was obtained from the slime by the autoclave method, and the reducing sugars and other matters were removed by precipitating the gum with alcohol. A thick mucilage gave the reactions of arabin.

The gum was hydrolysed upon boiling it for five hours with 5% sulphuric acid, and the neutral solution reduced Fehling's solution. Osazones were prepared, and after purification these were separated into arabinosazone (m.p. 158°), and another melting at 184°. It will be remembered that an osazone similar to the latter had been obtained from the gum of *Macrozamia*. Furfural was detected during the hydrolysis of the gum, and upon oxidation with dilute nitric acid there were obtained mucic and oxalic acids. It is therefore probable that the reducing

body which yielded the osazone with the melting point 184° is related in some way to galactose. The gum formed by this bacterium seems to lie midway between Macrozamia gum, the product of *Bac. macrozamia*, and gum Acacia, the product of *Bact. acacie*.

BACILLUS ALATUS, n.sp.

Shape, etc.—In or on ordinary media, it appears as a rod with rounded ends, staining sometimes bipolarly. On maltose media, it is generally furnished with lateral, globular capsules and the stained portion is shorter than it is broad. It is motile, the flagella being numerous and peritrichous. When stained with fuchsin, the colour is fast to 5% hydrochloric acid. The Gram stain is negative.

Relation to oxygen.—The growth under the mica plate was feeble.

Nutrient agar plate.—The colonies are translucent white and amœboid, the raised projections become club-shaped, and the growing points are raised and white, while the centre of the colony is flat and transparent. Some of the colonies are rounded, dirty-white, flat and waxy, with an uncharacteristic microscopical appearance. The deep colonies are granular and dark brown.

Glucose-gelatin plate.—The colonies are rounded, white, raised, fatty and opalescent by transmitted light, showing faint lines radiating outwards from the centre. Microscopically, the margin is sharp and the structure is finely granular with annular cloudings. The deep colonies are opaque.

Nutrient agar stroke.—The growth is raised and translucent white with smooth margin; it is of a thin gummy consistency. The colour slowly becomes pale buff and the growth gravitates.

Glucose-gelatin stroke.—The growth is raised, narrow, translucent white and glistening. The base becomes furrowed as the gelatin slowly liquefies.

Saccharose-potato-agar stroke.*—The growth is raised, translucent white and slimy; it becomes luxuriant and of a pale buff

* Saccharose 20, glycerin 10, potato extract 250, agar 20, water to 1000 c.c.

colour as it slowly gravitates. Gas bubbles are sometimes formed in the medium.

Nutrient gelatin stab.—A filiform white growth; the nail-head has a raised margin and depressed centre; the medium is consumed and slowly liquefies funicularly.

Glucose-gelatin stab.—The growth is as on nutrient gelatin but stronger; the nail-head is at first uniformly raised, but becomes corrugated and terraced. The filiform stab becomes coiled as the neighbouring medium softens, but no liquefaction is apparent. Gas bubbles form in the medium.

Potato.—A pale buff or canary-coloured glistening, rough growth is formed, while the medium darkens.

Bouillon.—The medium becomes turbid, and a slight surface film and coherent sediment is formed. Indol is produced, and nitrates are reduced to nitrites.

Milk.—The medium is slowly and slightly thickened and it then coagulates at 55°.

(Plate xxxv.)